Attachment 1: CalRecycle Workplan

Life Cycle Assessment of Organic Diversion Alternatives and Economic Analysis of Greenhouse Gas Reduction Options

http://www.calrecycle.ca.gov/Climate/Organics/LifeCycle/

Issue	Findings from LCA project	Action Needed	Status
Compost			
Greenhouse gas reduction benefits of compost application not fully quantified.	Additional research needed to quantify the greenhouse gas reduction benefits from compost application.	Conduct study to investigate the potential of compost to reduce N2O emissions from the agricultural sector.	Scope of work and contractor, UC Davis School of Land, Air and Water Resources, approved by CIWMB in December 2009, research scheduled to be completed in June 2012.
		Quantify reduction of irrigation water and associated energy/greenhouse gas savings from compost application.	Data gathered in contract with UC Davis School of Land, Air and Water Resources to investigate the potential of compost to reduce N2O emissions from the agricultural sector may provide information regarding moisture in soil. On-hold pending identification of funding.
		Quantify reduced pesticide/herbicide use and associated greenhouse gas savings from compost application.	On-hold pending identification of funding.
		Quantify greenhouse gas benefits from compost application associated water quality issues.	Interagency agreement with the University of California at Riverside to conduct research to quantify the benefits of compost and mulch application by studying compost-based Best Management Practices (BMP) in a field demonstration setting. The contract would provide for additional research to fill data gaps associated with water quality and soil conservation benefits.

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Compost			
Greenhouse gas emissions from composting process not fully quantified.	Additional research needed to quantify greenhouse gas emissions from the composting process.	Conduct research to measure ozone-forming potential for VOC emissions from compost process.	Scope of work and contractor, UC Davis School of Civil and Environmental Engineering, approved by CIWMB in December 2009, research scheduled to be completed in June 2012.
		Conduct study to measure CH4 and N2O emissions from composting process.	Scope of work and contractor, UC Davis School of Land, Air and Water Resources, approved by CIWMB in December 2009, research scheduled to be completed in June 2012.
		Conduct research to identify best management practices to reduce emissions from compost facilities.	Participate in technical advisory committee for SJVUAPCD study investigating impact of best management practices on compost emissions.
Anaerobic Digestion			
Biogas from anaerobic digestion can be converted to electricity or fuel.	The production of a transportation fuel was not considered in the study.	Quantify greenhouse gas emission reductions associated with producing a transportation fuel.	Work with the Air Resources Board to develop a model pathway for anaerobic digestion of municipal solid waste feedstocks for the Low Carbon Fuel Standard. Gather data on converting biogas to transportation fuel from industry.
There are multiple types of anaerobic digestion facilities.	LCA project generated GHG and economic data for generic stand-alone anaerobic digestion facilities and waste water treatment plant digesters only. Need data from other types of anaerobic digestion technologies.	Assess the capabilities of a landfill-based in-situ anaerobic digester technology designed to generate electricity, produce finished compost, and be cost effective with California's tip fee structure.	Complete landfill-based anaerobic digestion/compost research project with Yolo County. Final report expected to be released in Spring of 2010.
		Quantify the greenhouse gas and economics of additional types and sizes of anaerobic digestion (e.g., dry fermentation) facilities.	On-hold pending identification of funding.

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Anaerobic Digestion			
Anaerobic digestion facilities utilizing municipal solid waste feedstocks are not widely deployed in California.	Lack of operational data from stand-alone anaerobic digestion facilities.	Promote the development of facilities that use municipal solid waste as feedstock.	Participate on the AB 118 Advisory Committee to develop the 2010/2011 Investment Plan which includes production of biomethane from municipal solid waste feedstock. Adoption of Investment Plan expected in June/July 2010. Also participate on the technical review committee in developing grant criteria for feasibility study and/or project implementation of other types of anaerobic digestion projects. CalRecycle is also evaluating AB 118 proposals.
		Assist in the siting and expansion of anaerobic digestion facilities in California.	Complete a Program Environmental Impact Report (EIR) to assess the environmental impact of siting new and expanding existing anaerobic digestion facilities in California. A Program EIR will reduce the need for duplicative review of policy considerations related to anaerobic digestion facilities and expedite site-specific environmental review. Technical Advisory Group meetings underway. Draft EIR scheduled to be completed by summer 2010.
			How Anaerobic Digestion Fits Current Board Regulatory Structure guidance document published October 2009.
		Conduct education and outreach to increase knowledge of anaerobic digestion.	Work with California Organic Recycling Council, California Biomass Collaborative, and others to deliver educational sessions on anaerobic digestion.
Waste to Energy			

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Efficiency of energy recovery at waste to energy facilities.	Data collection effort did not generate detailed information. Study relied on average facility assumptions to generate conservative estimates.	Conduct research to determine efficiency of energy and metal (ferrous & non-ferrous) recovery from waste-to-energy facilities taking into account plant design, air pollution control equipment, heat value of feedstock, and other parasitic loads.	Accept data from industry and incorporate into future work.

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Recycling			
Lack of data regarding flow of materials that are collected for recycling to end use markets and associated greenhouse gas reductions.	Need additional information for recycling.	Research the infrastructure available to manage recycled material and the flow of those materials.	Conduct Baseline Infrastructure Inventory and Information Management Framework study with RW Beck; estimated completion in December 2010.
		Assist local jurisdictions in implementing policies that increase commercial recycling.	Contract with the Institute for Local Government to develop a sample mandatory commercial recycling ordinance. Project includes case studies of jurisdictions that are implementing commercial recycling programs and evaluation of associated greenhouse gas emission reductions. Sample commercial recycling ordinance completed. Contract scheduled for completion in May 2011.
Extended producer responsibility.	Additional life cycle data would be helpful in understanding greenhouse gas implications of products with end-of-life impacts.	Conduct research to understand the potential greenhouse gas, environmental, economic, and social benefits of a producer responsibility approach to product management.	Scope of works and contractors, University of California at Berkeley and University of California at Santa Barbara, approved by CIWMB in December 2009; research to be completed in June 2012.
Emission factors for recycling materials.	Need California emission factors for recycling.	Collaborate with Air Resources Board staff in the development of Recycling Emission Reduction Factors to be used in California.	On-going.
Biomass			
Meet the Governor's target of 20 percent of the State's renewable energy goals from biomass resources.	The four scenarios that were modeled did not result in an expansion of the biomass market.	Promote the expansion of the biomass market.	Participate on the Bioenergy Interagency Working Group to develop state policy on biomass, which includes electricity, natural gas and petroleum substitution potential and reflects the benefits of reducing municipal solid waste using conversion technologies. Development of the 2010 Bioenergy Action Plan is currently underway. Staff is providing technical support. Anticipate adoption of the 2010 Bioenergy Action Plan in November 2010.

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Landfill			
Greenhouse gas emissions from landfills not fully quantified.	Uncertainty regarding landfill cover oxidation rates and landfill gas collection efficiency.	Assess and demonstrate the long-term performance, long-term effectiveness, and maintenance requirements of using a biologically active cover, or biocover, consisting of suitable readily available organic material, to help mitigate methane emissions over the surface of a landfill.	Contract under way with Yolo County; expect final report to be published in 4th quarter of 2010.
		Collaborate with Air Resources Board staff to develop a control measure to provide enhanced control of methane emissions from municipal solid waste landfills. The control measure will reduce methane emissions from municipal solid waste landfills by requiring gas collection and control systems on landfills where these systems are not currently required and will establish statewide performance standards to maximize methane capture efficiencies.	At its June 25, 2009, public hearing, the Air Resources Board approved for adoption California Code of Regulations, Title 17, Article 4, Sub Article 6, Sections 95460 to 95476, Methane Emissions from Municipal Solid Waste Landfills. Work with ARB to explore opportunities to increase energy recovery from landfill methane gas.
		Develop improved methods for estimating landfill methane emissions in the context of the California greenhouse gas inventory.	Contract with Landfills +, Inc., USDA-ARS, and Florida State University under way and will result in a new validated computer model that will be used to estimate methane emissions from California landfills. The beta version of the model is being evaluated. The final model to be available in the summer of 2010.

Issue	Findings from LCA project	Action Needed	Status
Economics			
Lack of regional cost data.	Data collection effort did not generate regional cost data for recycling.	Conduct cost study on commercial recycling to address potential costs and savings from increased business waste diversion.	Cost Study on Commercial Recycling with HF&H Consultants, LLC underway that will examine the incremental costs and savings of selected business diversion programs by focusing on key material types currently disposed that have significant potential for both disposal and greenhouse gas reduction. In conjunction, the study will develop an online calculator to assist businesses when evaluating the management of materials. Commercial diversion tool currently undergoing testing. Final report and tool scheduled for completion by Summer 2010.
Cost of diversion alternatives.	Diversion alternatives tend to be more expensive than landfilling.	Develop options that provide economic incentives for diversion alternatives.	Worked with Climate Action Reserve on the development of an Organic Waste Digestion Protocol that was adopted by the Climate Action Reserve Board in October 2009.
			Staff is participating on the Climate Action Reserve Composting Protocol Technical Workgroup. Adoption of an offset protocol anticipated in June 2010.
			Assist the California Energy Commission in development of grant criteria that stimulates the construction of anaerobic digestion projects and reviewing grant solicitations in response to Assembly Bill 118, Alternative and Renewable Fuels and Vehicles Program.
			Provide Recycling Market Development Zone loans to qualified applicants.